New Zealand sea lion research Summer 2008/2009

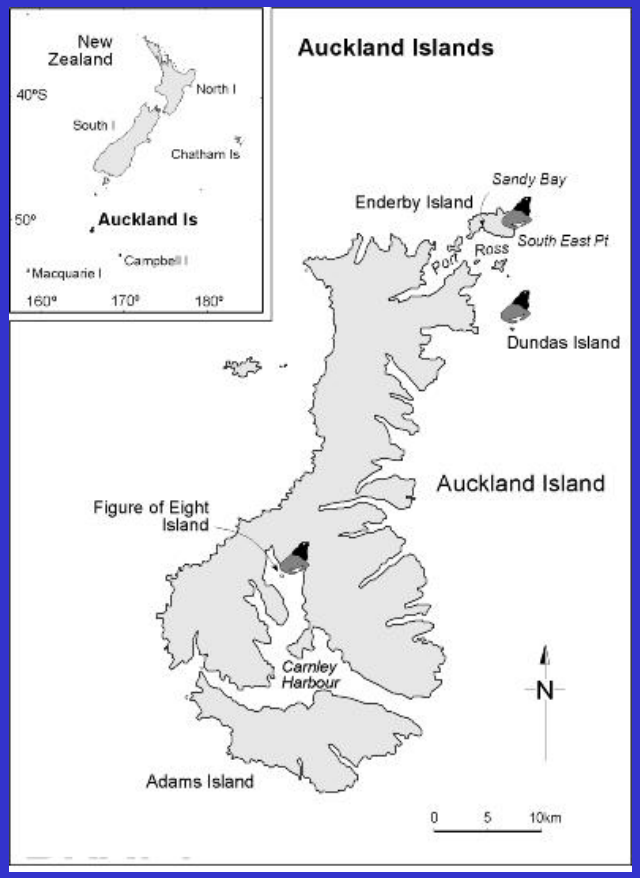
B. L. Chilvers

NZ sea lion research objectives Auckland Islands

- Measure Auckland Islands pup production
- Tag pups produced during 2008/09
- Data to estimate survival and reproduction of previously marked female NZ sea lions
- Maintain and update the NZ sea lion database
- Characterise and analyse the at-sea distribution of poorly known age and sex classes of NZ sea lions

Pup production - methods and date of estimate

- Sandy Bay (Enderby Island) - Mark/Recapture estimate (16/1/09)
- Dundas Island - Mark/Recapture estimate (21/1/09)
- S.E. Point (Enderby Island) - Direct count -daily counts
- Figure of 8 Island - Single direct count - (9/1/09)



Pup production 2008/09 - Results

- Sandy Bay = 301
  - 289+/-2 live pups
  - 12 dead pups
- Dundas = 1132
  - 1065 +/- 16 live pups
  - 67 dead pups
- South East Point = 14
  - 8 live pups
  - 6 dead pups
- Figure of 8 = 54
  - 48 live pups
  - 6 dead pups

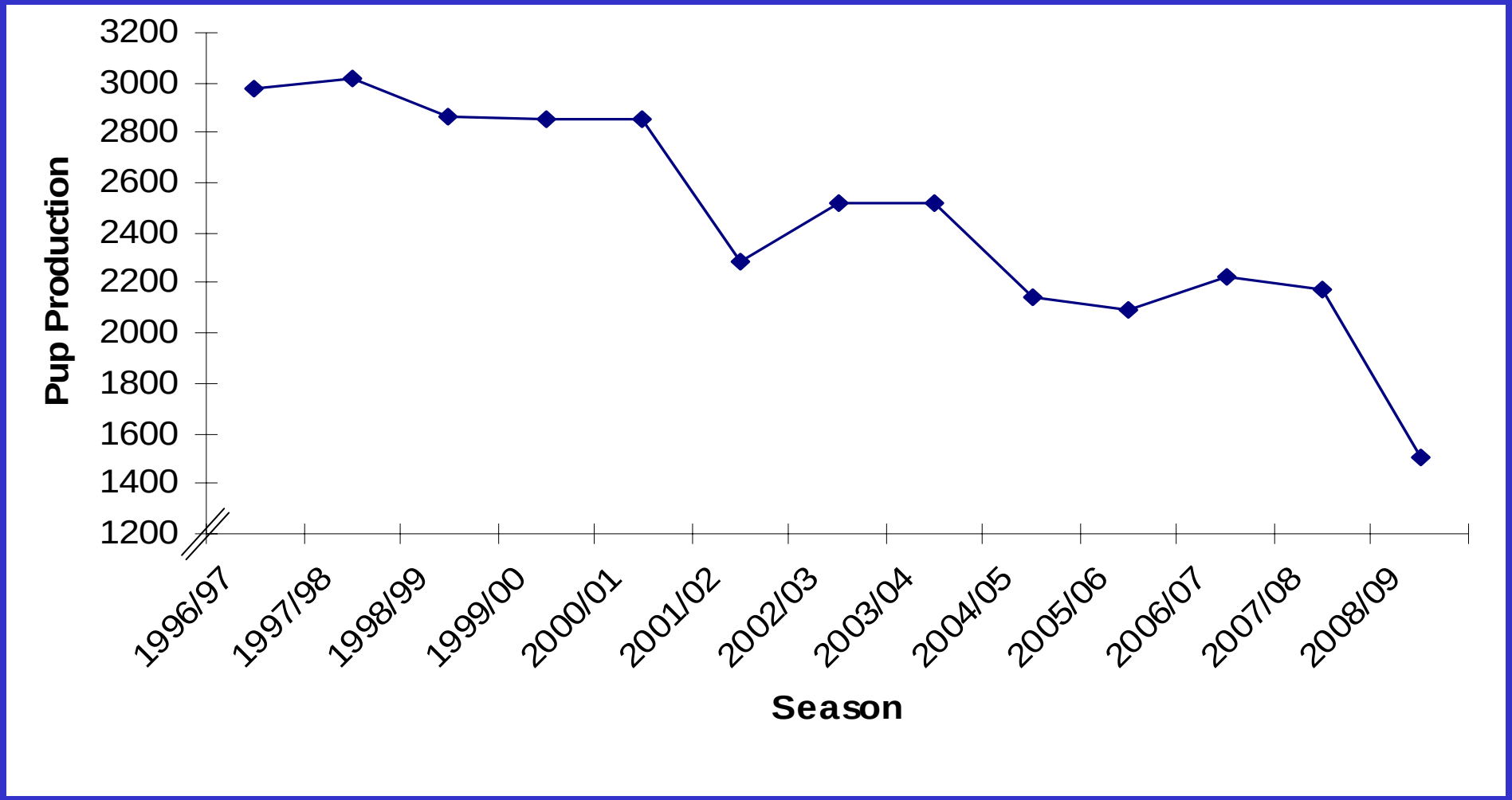
Total for Auckland Islands =

1501 +/- 18 08/09

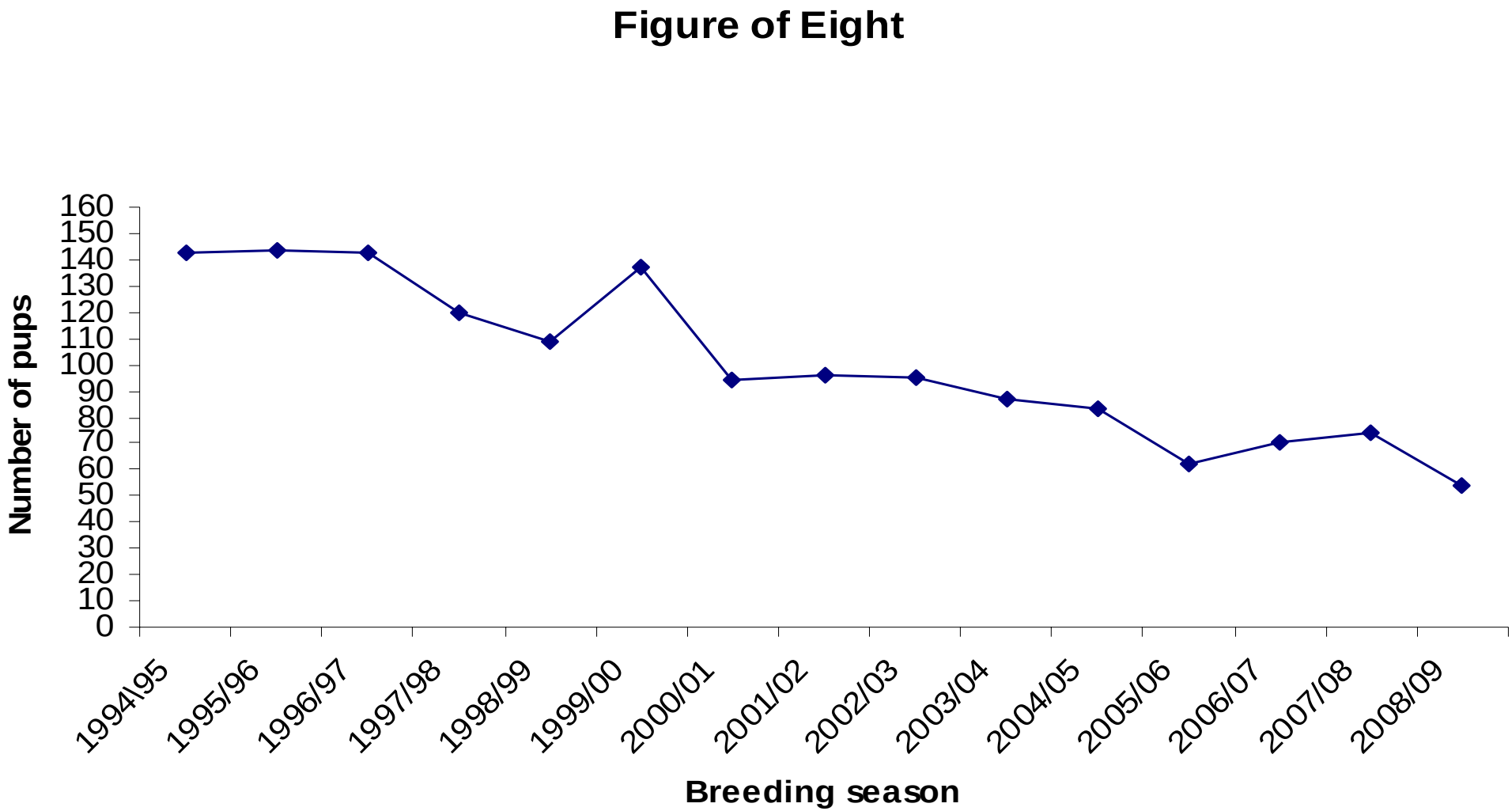
2175 +/- 46 07/08

- 31%

AUCKLAND ISLANDS PUP PRODUCTION 1997-2009



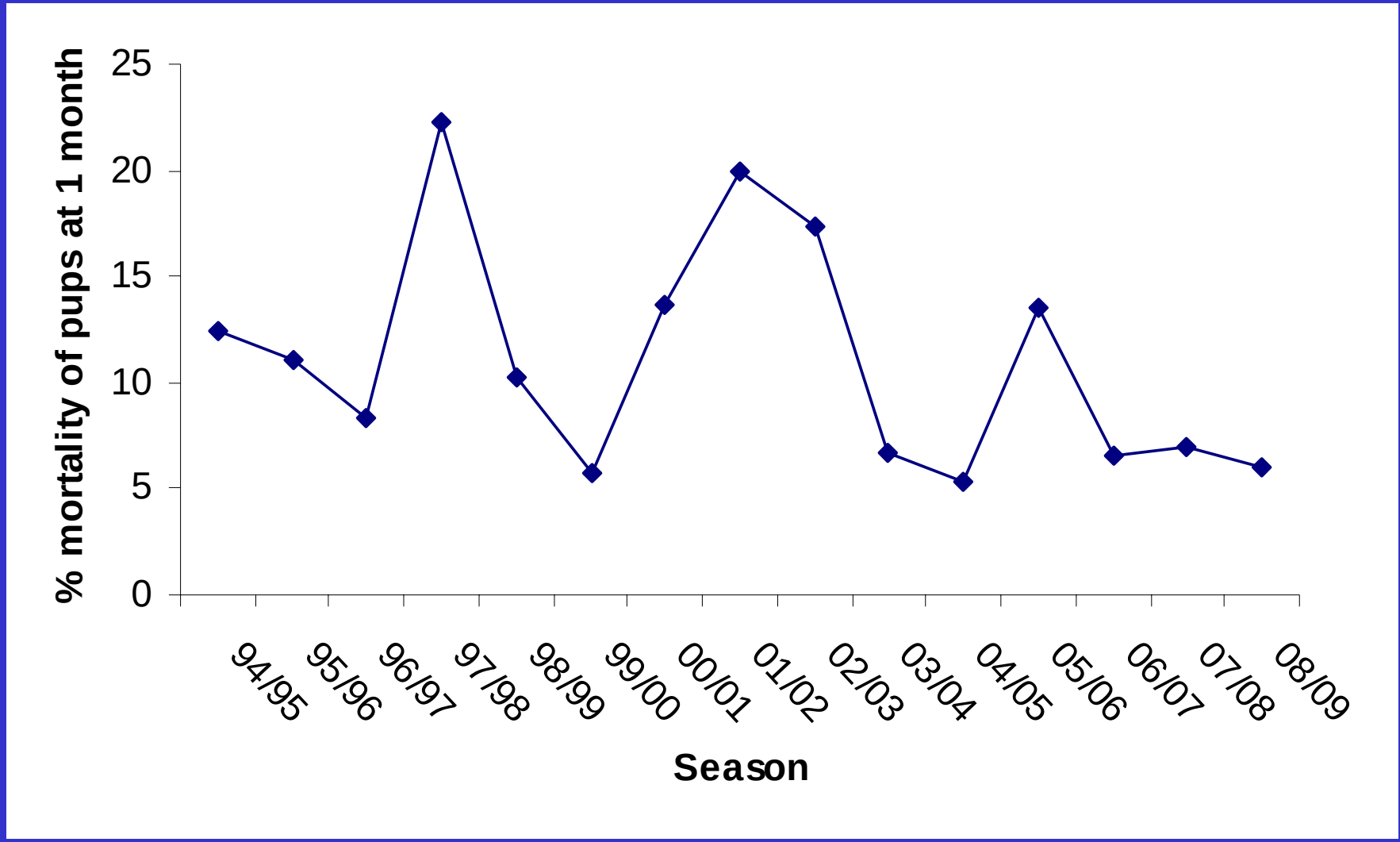
Pup counts at Figure of Eight Island



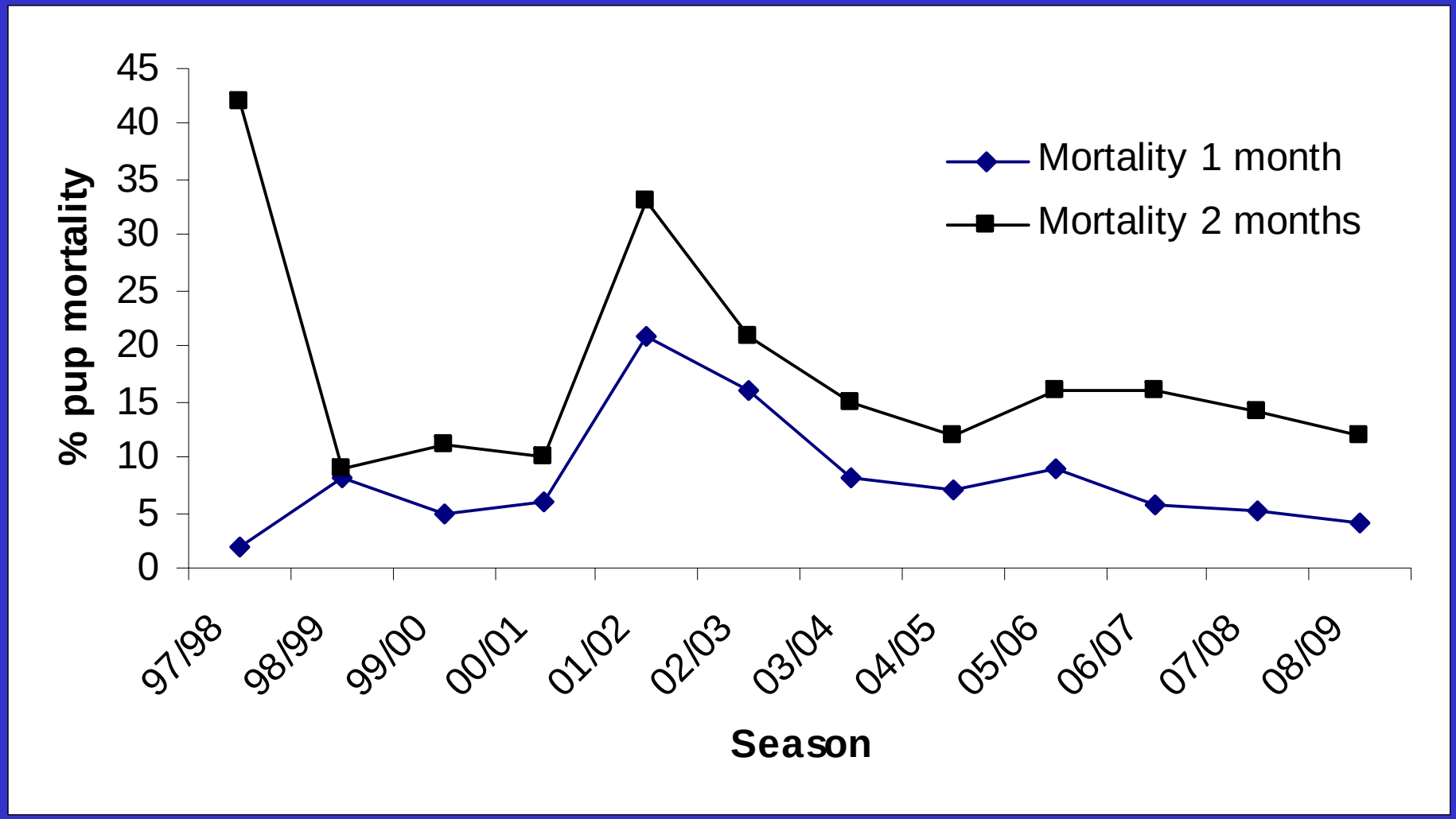
Pup tagging – Satellite tagging

- 701 pups were double tagged for population studies.
- Eleven juvenile sea lions (4 male / 7 female) aged between 2 and 5 years were captured and satellite tagged at Sandy Bay, Enderby Island. Deployment lasted between 11 and 40 days.
- Enderby, Rose, Dundas, Ewing, Fig. of 8, Adams, Campbell, Snares and Stewart Islands, Ross and Carnley Harbours, NE Auckland Islands and Catlins / Otago searched or reports obtained.

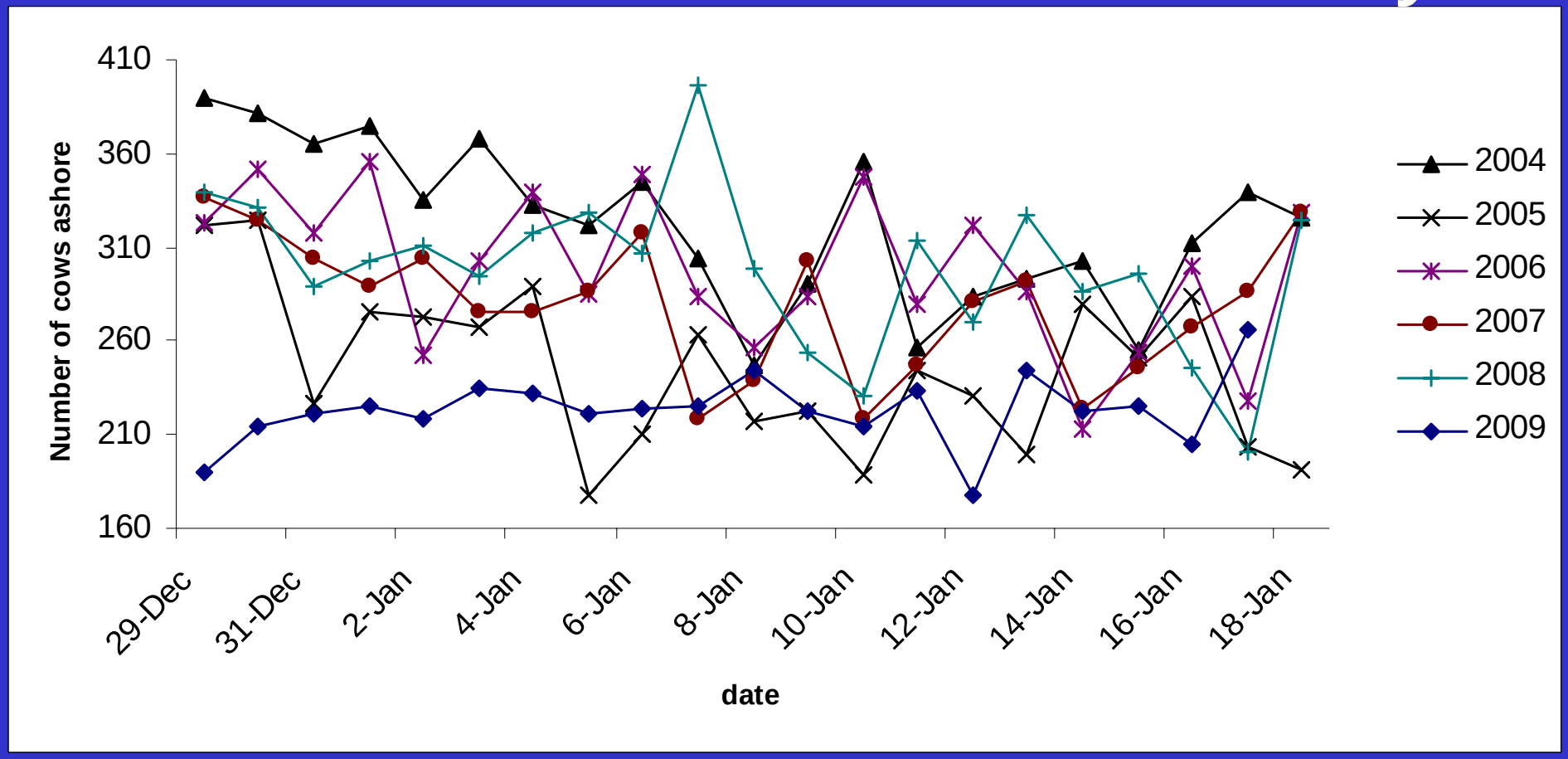
Pup Mortality



Pup Mortality – Sandy Bay

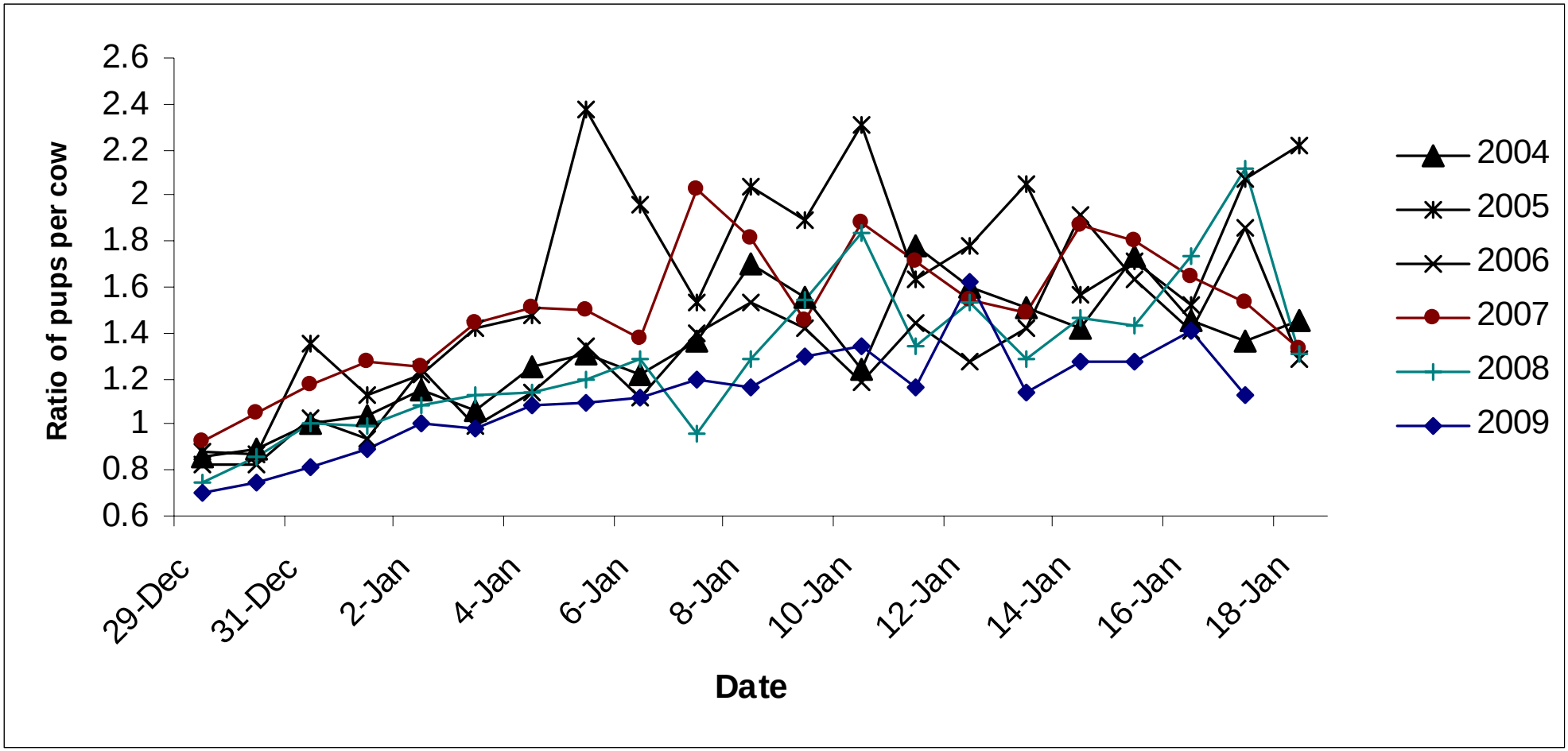


Number of females ashore daily

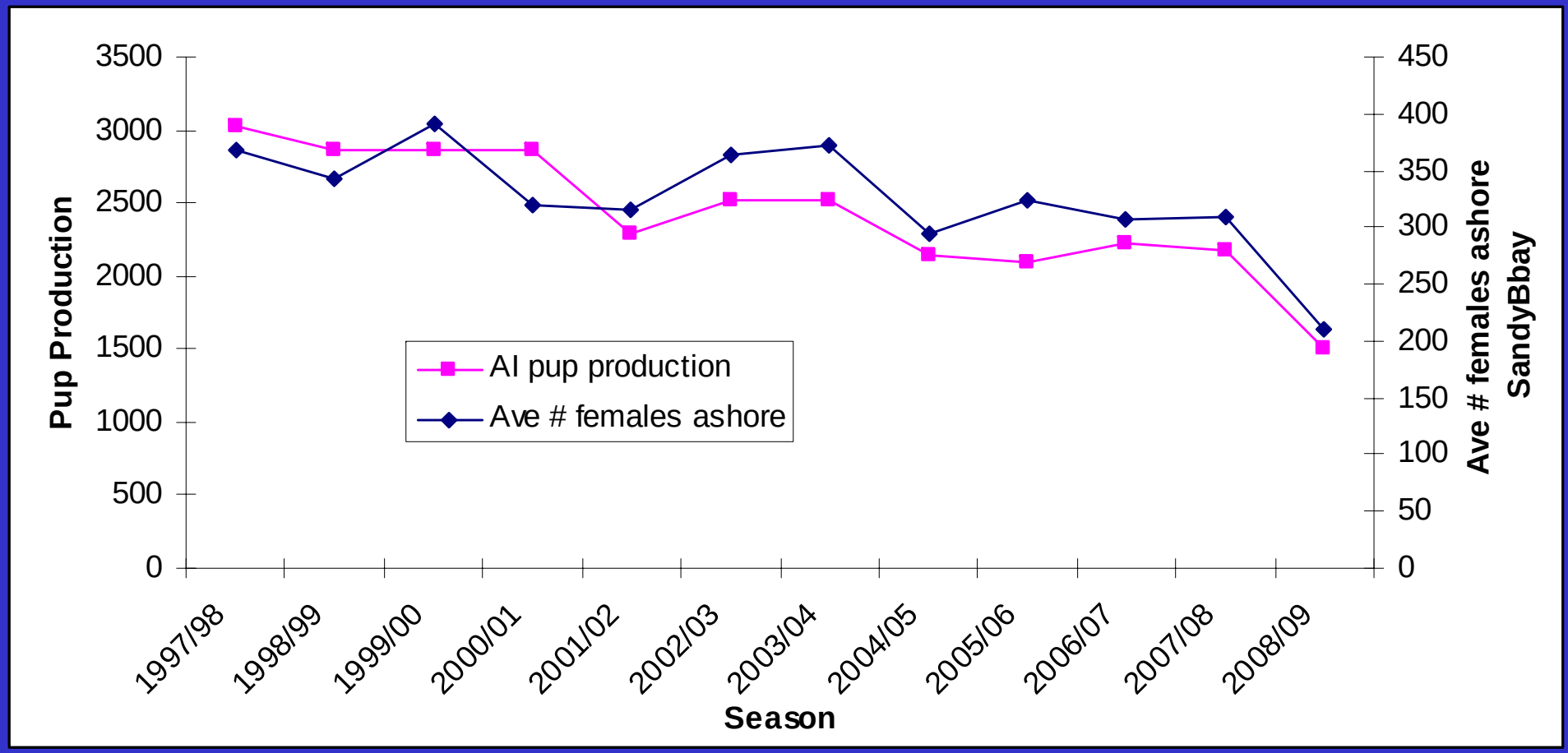


31% drop in pup production due to 30% decrease in # females ashore

Pup:Cow ratio at Sandy Bay



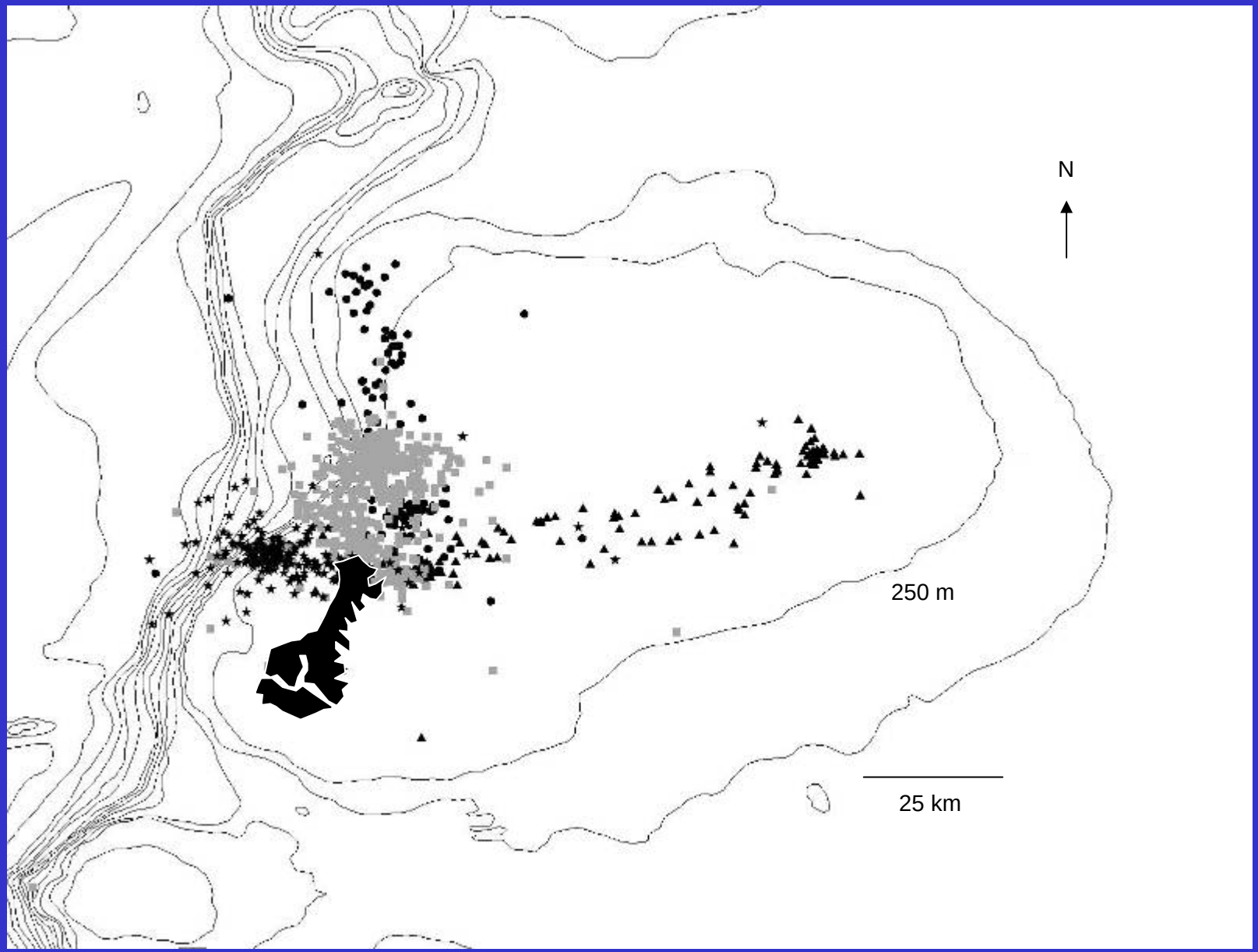
Auckland Is pup production & ave. # of adult females ashore daily (27th Dec - 2nd Jan Sandy Bay



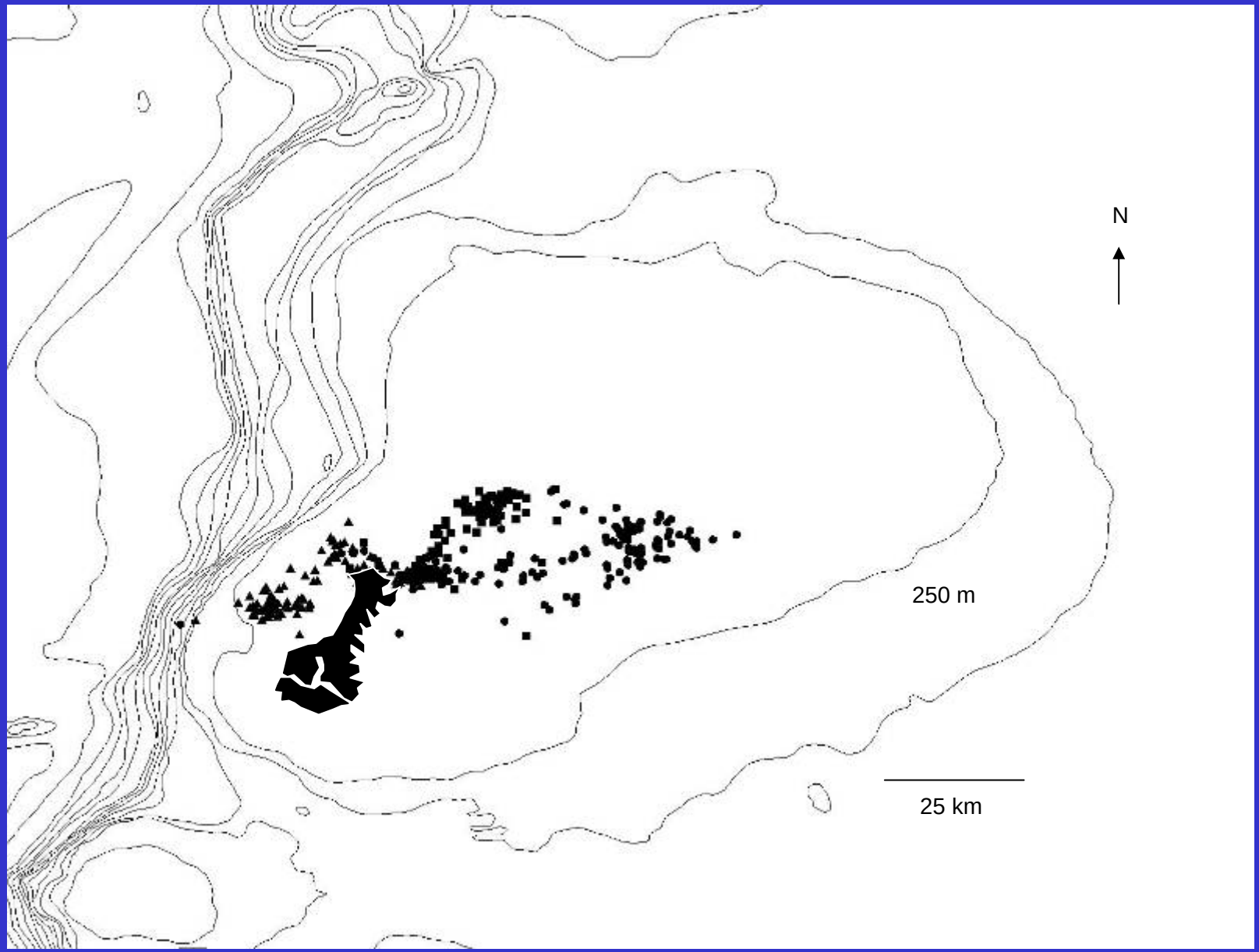
Dates, tag number, satellite tag id, sex, age, weight, length, girth, number of days deployed and number of satellite locations received from 10 juvenile sea lions captured January 2008.

Date	Tag	Satellite tag id	Sex	Age	Weight	Length	Girth	Days	Number of satellite locations
11/01/2009	4907	1757	M	5	117	184	107	14	138
15/01/2009	7458	49093	F	2	57	140	90	13	105
15/01/2009	6363	76964	F	3	79	165	98	10	135
19/01/2009	6485	67260	M	3	85	159	98	12	208
19/01/2009	7610	76965	F	2	54	140	84	25	316
20/01/2009	6214	54760	M	3	81	160	104	13	139
20/01/2009	6218	54761	M	3	76	155	92	38	570
20/01/2009	6536	76963	F	3	70	157	93	19	235
25/01/2009	7445	89574	F	2	53	138	83	9	149
25/01/2009	8023	49094	F	2	54	135	84	17	206

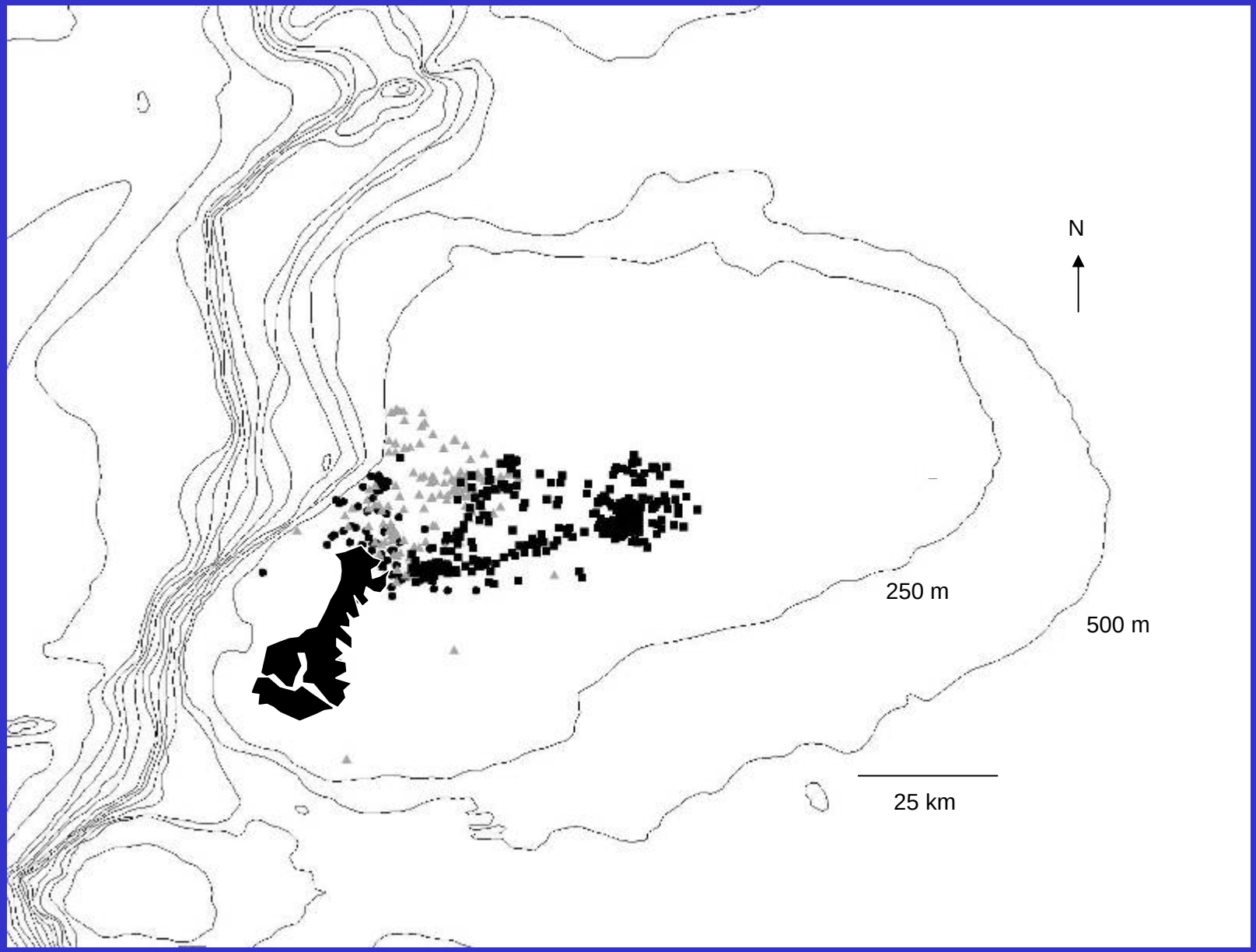
Satellite locations juvenile male NZ sea lions 4907 ● 6485 ★6214 ▲& 6218 ■



Satellite locations of juvenile female NZ sea lions 7445 ■ 8023 ● & 6363 ▲



Satellite locations of juvenile female NZ sea lions 6536 ▲ 7458 ● & 7610 ■



Analysis of at sea distribution of juvenile New Zealand sea lions in a fisheries context, Auckland Islands 2008

Methods

- Ten juvenile NZ sea lions captured at Sandy Bay, Enderby Island January 2008.
- Data on all commercial trawl fishing between 1/7/07 to 30/6/08 in the 6T area surrounding the Auckland Islands were supplied by the Research Data Management (RDM) section of the Ministry of Fisheries, New Zealand.
- Trawls targeting arrow squid and scampi accounted for 89% of fishing effort.
- The overlap of distribution of satellite locations of juvenile NZ sea lions and fishing effort (using trawl tow start location) for each fishery was estimated.
- First, the number of juvenile sea lion locations within each 10 x 10 km area was summed. This was then compared with the total number of trawl start locations within each 10 x 10 km area. This gave a relative interaction scale.
- The estimated level of interaction will be highest in regions with high NZ sea lion foraging and high commercial fishing effort and zero where there is no active of either or where sea lions forage but no fishing occurs or vice versa.

Results

- The distribution of the 1634 satellite locations of juvenile NZ sea lions during January and February 2008 are given in Fig. 1a.
- The spatial distribution of fishing effort (trawl start locations / 10 x 10 km area) for arrow squid (February to May 2008) and scampi (July 2007 to June 2008) fisheries are given in Fig. 1b & c. Over this period, there were a total of 1241 tows targeting squid and 1297 tows targeting scampi recorded by RDM.
- An additional 319 tows targeted other species (July 2007 and June 2008).
- The estimated spatial overlap between juvenile NZ sea lion satellite locations and the distribution of fishing effort around the Auckland Islands is given in Fig. 1d–e.
- This analysis assumes that the probability or risk of interaction is proportional to the extent of overlap of NZ sea lion distribution and commercial fishing effort distribution at any location. However, the overlay is at the seasonal level, i.e. tow start positions and satellite locations are not linked on a finer (e.g. daily) temporal scale.
- The estimated level of interaction will be highest in regions with high NZ sea lion foraging and high commercial fishing effort (Fig. 1d and e).

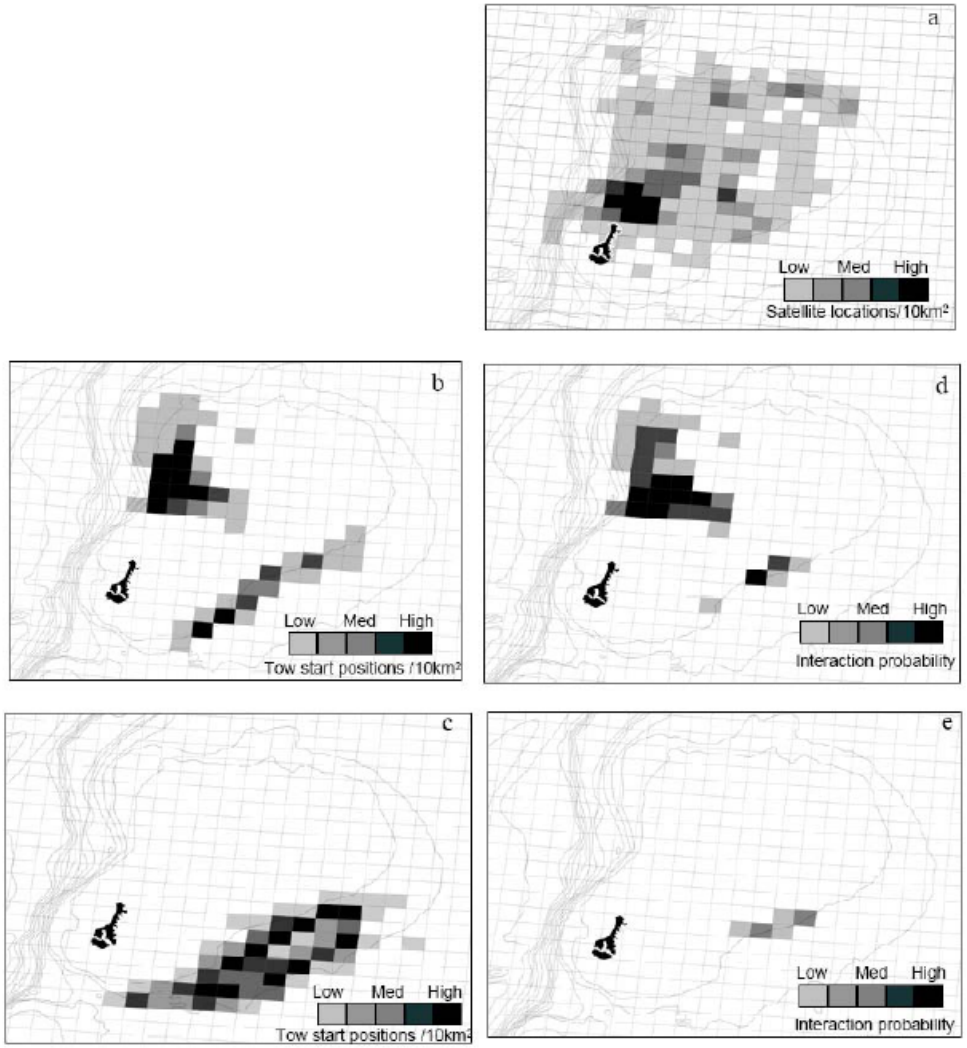
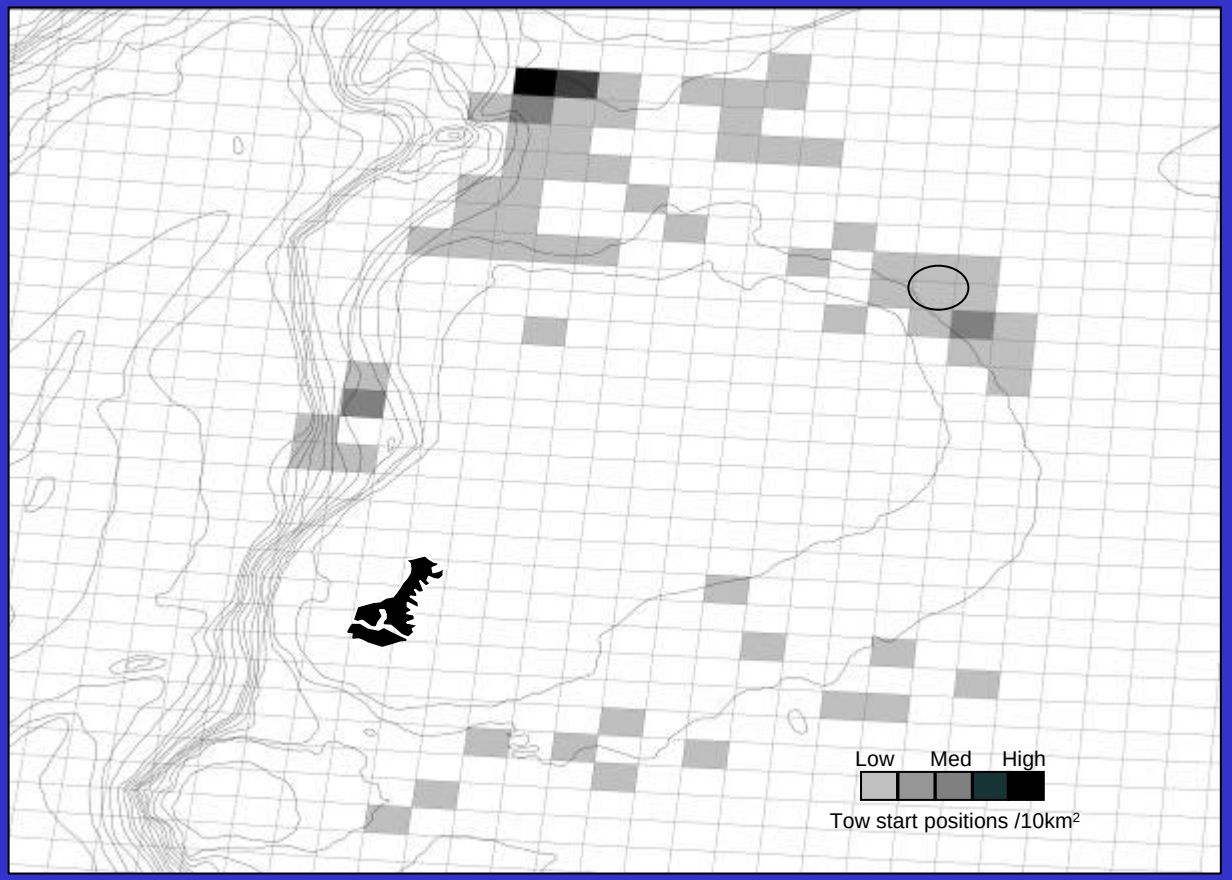


Figure 1. (a) Estimated distribution of 10 juvenile NZ sea lions (satellite locations/10 x 10 km area January & February 2008) and (b) the distribution of fishing effort in the 6T squid trawl fishery (tow start positions/10 x 10 km area, February to May 2008) and (c) the 6T scampi trawl fishery (tow start positions/10 x 10 km area, Nov 2007 and June 2008) in the Auckland Islands 6T area (Scale 1-10 locations or tows per area (Low), 11-20, 21-30 (Med), 31-40, 40+ (High)). The estimated interaction probability between juvenile NZ sea lion distribution and fishing activities for each fishery are presented in (d) and (e) (Scale 1 (Low), 2, 3-4 (Med), 5-6, 7 (High)).

Distribution of fishing effort for all OTHER species targeted (other than squid and scampi) July 2007 to June 2008 around the Auckland Islands 6T area



2009-2010 Field Objectives:

1) Collect field data that will allow quantification and estimation of:

- sea lion pup production

- survival of previously marked NZ sea lions

- reproduction by known-age female NZ sea lions

2) Maintain and update NZ sea lion database

3) Characterise at-sea distribution of poorly known age and sex classes of NZ sea lions

Field Trip Logistics

First Team: 3/4 people

Leave Bluff 30th November 2009

Return ~ 13th January 2010

Second Team: 6 people

Leave Bluff 7th January 2009

Return ~ 20th February 2010

Pup production field data - methods and date of estimate

- Sandy Bay (Enderby Island) - Mark/Recapture estimate (16/1/10)

  - Direct count & daily counts
- Dundas Island - Mark/Recapture estimate (21/1/10)
- S.E. Point (Enderby Island) - Direct count & daily counts
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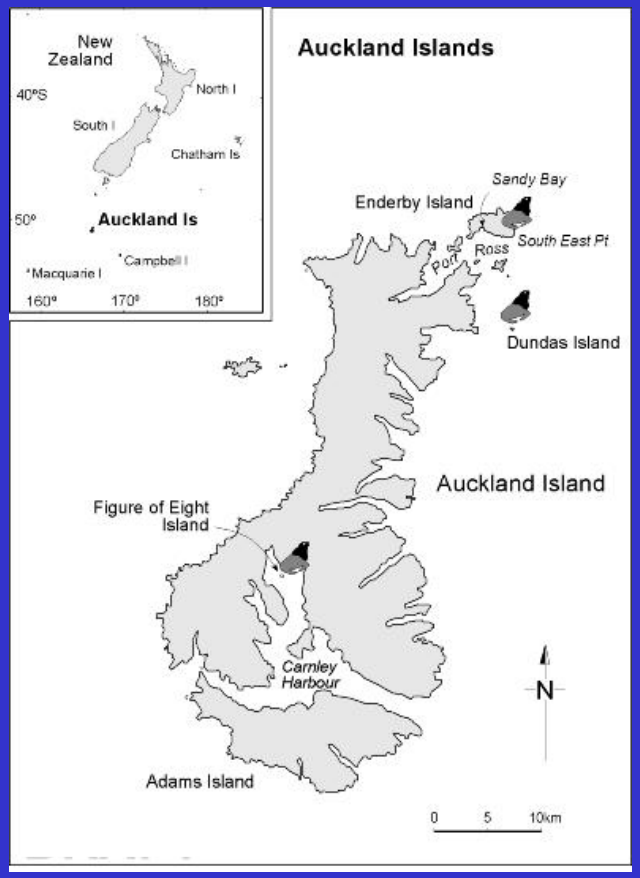

Pup tagging

- All pups at Sandy Bay and SEP will be double flipper tagged with blue DALTON super tags.
- 400 pups from Dundas Island (300 female and 100 males) will be double flipper tagged with blue DALTON super tags.
- As many pups as possible will be double flipper tagged with red DALTON super tags at Figure of Eight Island (numbers of pups tagged restricted due to location logistics).

Collect field data to allow quantification and estimation of:

- survival of previously marked NZ sea lions
- reproduction by known-age female NZ sea lions

* Daily resightings of previously tagged and branded animals at SEP & Sandy Bay between early Dec & late Feb.
* Opportunist sightings collected from Figure of Eight & Dundas Island.
* Opportunist sightings collected from islands in the Ross Harbour and Auckland Island mainland.
* At the time of resighting tag number, tag colour, number of tags, date of sighting, location and reproductive status are recorded.
* When possible animals double tag scares will have their PIT tags read.
* All sightings will be added to the NZ sea lion database.

Characterise at-sea distribution of poorly known age and sex classes of NZ sea lions

* Satellite, time depth recorded (TDR) and VHF tag up to 12 juvenile NZ sea lions, 6 of each sex, each season.
* All from Sandy Bay, Enderby Island